

Cascade Reservoir Water-Quality Concerns:

Cascade Reservoir is located in the Payette River Basin of southwestern Idaho. Major tributaries to the reservoir include the North Fork Payette River (NFPR), Mud Creek, Lake Fork, Boulder Creek, Gold Fork River and Willow Creek, all of which discharge into the northern end of the reservoir. The overall watershed is divided into seven separate subwatersheds on the basis of drainage areas to these tributaries: NFPR, Mud Creek, Lake Fork, Boulder/Willow Creek, Gold Fork River, Cascade and West Mountain.

The Cascade Reservoir Watershed encompasses approximately 357,000 acres located in a moderately high elevation valley between West Mountain and the Salmon River Mountains. The watershed contains two major drainages: Big Payette Lake drainage area, located in the northern end of the watershed, and the direct drainage area to Cascade Reservoir (the area included in this watershed management plan) that covers approximately 300,980 acres. A major portion of the watershed is steeply sloped forested land, while the area immediately adjacent to the reservoir and major tributaries is predominantly shallow-sloped agricultural land. Elevation of the valley floor and reservoir is approximately 4850 feet. Only minor changes in local relief occur on the valley floor, while elevation increases sharply once into the forested lands. Anthropogenic features such as ponds, irrigation ditches and diversions dominate the flow of water within the watershed. Predominant stream-flow within the watershed is north to south along the length of the valley.

Cascade Reservoir was created in the spring of 1949 with the completion of Cascade Dam, an earthen structure 107 feet high and 785 feet long, which was constructed across the NFPR, north-northwest of the present day location of the City of Cascade. Congress authorized construction of the reservoir to provide storage for irrigation and power generation at Black Canyon Dam on the main stem Payette River near Emmett, Idaho. Full storage was reached in 1957. The reservoir is 21 miles long, 4.5 miles wide at the widest point and is relatively shallow, measuring 26.5 feet in average depth. Cascade Reservoir is operated by the U.S. Bureau of Reclamation (BOR) in correlation with two other reservoirs (Deadwood and Black Canyon) to meet irrigation, hydropower, flood control, recreation and wildlife habitat needs. Maximum storage capacity is 703,200 acre-feet. A 50,000 acre-foot minimum pool has been congressionally authorized, and although the BOR has

the authority to lower the reservoir to this level, an administrative decision was made by the BOR in 1984 that a 300,000 acre-foot minimum pool would be maintained. This decision was based on an Idaho Department of Fish and Game study that evaluated the minimum pool required to provide adequate over-winter habitat for fish within the reservoir (Reininger, 1983).

Under section 303(d) of the Clean Water Act (CWA), Cascade Reservoir has been identified as water-quality limited due to excessive phosphorus loading to the reservoir from the surrounding watershed. Nuisance algae growth resulting from nutrient loading has impaired beneficial uses of the reservoir, specifically, fishing, swimming, boating and agricultural water supply. The plan developed for achieving water-quality improvements in Cascade Reservoir has three phases:

Phase I Initial water-quality assessment and nutrient reduction goal, approved by EPA May 13, 1996.

Phase II Further evaluation of phosphorus reduction goals and alternatives, to be completed by December 31, 1998.

Implementation Plan A subwatershed-specific outline of projects that have been and will be initiated to effect required water-quality improvements within Cascade Reservoir. Will be completed within 18 months of the Phase II document (~June 2000).

Phase III Plan evaluation and monitoring summary to determine if modification of management practices is necessary to attain water-quality goals within the reservoir.

Phase I was implemented in January of 1996. The Phase II Watershed Management Plan (Phase II) has been compiled with the purpose of refining and augmenting information available in the Phase I plan. The purpose of both the Phase I and the Phase II management plans is to improve water quality in Cascade Reservoir through the joint efforts of concerned government agencies and land owners. Both the Phase I and the Phase II management plans utilize a watershed management approach to address water-quality concerns, as pollutant sources distributed throughout the watershed drain into the reservoir and impact water quality. This Watershed Management Plan constitutes the functional equivalent of a total maximum daily load (TMDL) (EPA, 1991) and is consistent with Idaho Code 39-3601.

Public Involvement

As public involvement is viewed as critical for the entire TMDL process, a structured citizen involvement program was established that included a watershed advisory group (WAG), a technical advisory committee (TAC) and other specific work groups. The Cascade Reservoir Coordinating Council (CRCC) functions as the WAG for this TMDL process. Its membership includes nine local representatives appointed by the Boise Regional Office of Division of Environmental Quality (DEQ) from all major sectors of the local community. CRCC members work directly with their respective interest groups to provide direction to DEQ in developing and implementing a watershed

management plan, and help identify funding needs and sources of support for specific projects that may be implemented.

The TAC is responsible for reviewing proposed projects to ensure they are consistent with phosphorus reduction goals, are scientifically sound and that monitoring follows scientifically accepted procedures. The membership of the TAC includes scientific and engineering representatives from local, state and federal agencies, industry and municipal staff.

Work groups were formed to generate a "source plan" for each of the designated nonpoint source categories (forestry, agriculture, and urban/suburban) that would assess nonpoint source phosphorus loading. These groups represent a variety of interests common to the source-plan specific land-use activities. The source plans generated were used as data sources for the Phase II document.

Water-Quality Concerns and Status

The water quality of Cascade Reservoir has been identified as impaired under section 303(d) (1998) of the CWA, due to violations of water-quality standards for dissolved oxygen, nutrients and pH. The reservoir was listed as a high priority for TMDL development.

Beneficial uses for Cascade Reservoir include domestic and agricultural water supply, cold-water biota, salmonid spawning, and primary/secondary contact recreation. Those uses that have been found to be at risk are agricultural water supply (toxic algal blooms), cold water biota (depressed dissolved oxygen (DO) and warm temperatures) and primary and secondary contact recreation (toxic algal blooms).

Applicable Water-Quality Standards and Criteria

Numerical standards for pH (6.5 to 9.5 standard units), temperature (Cold Water Biota: 22 °C daily maximum, 19 °C maximum daily average; Salmonid Spawning: 13 °C daily maximum, 9 °C maximum daily average, during time periods designated for salmonid spawning and incubation) have been established by the State of Idaho (IDAPA 16.01.02), and dissolved oxygen in lakes and reservoirs (≥ 6 mg/L at all times, except for the bottom 20% of water depth in lakes and reservoirs where depths are thirty-five (35) meters or less, and hypolimnion waters in stratified lakes and reservoirs). These parameters represent regulatory standards for Cascade Reservoir.

Narrative criteria for nutrients state that waters should be free from excess nutrients that can cause visible slime or other nuisance aquatic growths impairing designated beneficial uses (IDAPA 16.01.02.200.06). Coliform bacteria standards have also been established for primary and secondary contact recreation (IAPA 16.01.01.250).

Historical data

Approximately 30 years of water-quality data is available for Cascade Reservoir and the surrounding watershed. Initial monitoring consisted of the evaluation of fish-habitat by Idaho Department of Fish and Game (IDFG) and water-quality parameters by the BOR. Further studies of water quality in Cascade Reservoir (Clark and Wroten, 1975; Klahr, 1988; Klahr, 1989; Entranco, 1991; Ingham,

1992; Worth 1993 and 1994) have indicated significant impairment resulting from excess nutrients entering the reservoir through tributary and diversion inflow, and overland runoff.

In 1975, Clark and Wroten reported that water quality within the reservoir was good yet slightly eutrophic, noting that ortho-phosphate was conducive to algae growth. Later reports demonstrated that phosphorus was entering the reservoir from point and nonpoint sources (primarily spring runoff and irrigation returns). Continued inputs of phosphorus and fluctuations in water level within the reservoir have led to eutrophic conditions.

Routine, scheduled monitoring was started by DEQ and other agencies for specific inflake sites in 1992, and in 1993 for all major tributaries. In 1993, pollutant loads and an unusual runoff pattern combined to produce dense mats of blue-green algae on the reservoir. In September 23 cattle died as a result of ingesting toxins produced by the blue-green algae (Long Valley Advocate, 1993). As a result, health advisories were issued by DEQ discouraging contact with the reservoir water. Unfortunately, 1994 was a low water year. The high pollutant loads in 1993, combined with the reduced reservoir volume and low flows of 1994 resulted in decreased dissolved oxygen levels due to algal growth and decay, warmer water temperatures produced by low water levels and increased sediment phosphorus release. This series of events resulted in a substantial fish kill affecting nearly all species of fish, and impacted beneficial uses for both 1993 and 1994.

Data collected for water years 1995 and 1996 (both slightly above average precipitation) indicate increased flow volume and subsequent increases in water quality, although the listed standards and criteria were not achieved. Fisheries within the reservoir rebounded to some extent but have not regained their pre-1993 status.

Water-quality data reveal that a significant phosphorus load is carried in the increased flows present during spring runoff. Poor conditions within the watershed, especially within the riparian areas, may be contributing to this situation. As spring flows increase, degraded riparian areas contribute to increased phosphorus loads with accelerated runoff due to inadequate sediment and ground-water holding capacities.

There are several major indicators of water-quality impairment for Cascade Reservoir. Algae blooms represent the most obvious visual indication of poor water quality. In mid to late summer, dense algae blooms are noticeable on the water surface. As a visual indicator, algae blooms are occurrences of concern to the local population and to the transient tourist population utilizing the reservoir. Additional key indicators of water-quality impairment within the reservoir are increased nutrient and decreased dissolved oxygen concentrations. Both of these analytical indicators are directly related to the algal growth. Nutrients (most notably phosphorus) represent a primary algal food source and dissolved oxygen is depleted as algae die, sink below the surface and decompose. During the summer months, substantial oxygen depletion occurs in the lower depths of the reservoir as the algae settle within the water column.

Because of the direct relationship between algal growth, depleted dissolved oxygen and high total phosphorus concentrations within the water column, the reduction of total phosphorus input to the

reservoir is being specifically targeted as a mechanism for overall water-quality improvement. Historical monitoring data for total phosphorus measurements represent the most complete and reproducible data set available for the watershed. For this reason, total phosphorus measurements were targeted for both load estimation and reduction allocations. Ortho- and bioavailable phosphorus represent the portion of phosphorus readily available for uptake by aquatic organisms. Total phosphorus is a measurement of all phosphorus that may *ever* be available for biological uptake, thus offering an estimation of long-term availability within the watershed. Total phosphorus loading modifications have been addressed through the load allocations and reductions discussed below. Dissolved oxygen and pH modifications will be addressed through activities implemented for phosphorus load modification resulting in reduced algal growth.

It should be noted that because of the complex hydrology within the watershed and the lack of available data on bedload sediment and delivery, only suspended loads were evaluated for the purpose of this document. Interpretation of the values presented and the conclusions drawn should be made with these considerations in mind.

Pollutant Source Inventory

As part of the plan to improve the water quality in Cascade Reservoir, phosphorus contributions from point and nonpoint sources have been evaluated.

Point Source Pollution

There are two point sources of pollution to Cascade Reservoir, the McCall wastewater treatment plant (WWTP) and the IDFG fish hatchery in McCall. Both sources discharge nutrients and other pollutants directly to the NFPR upstream of Cascade Reservoir under NPDES permits. For the purposes of this document, the major pollutants of concern associated with the WWTP and IDFG fish hatchery discharge are nutrients, predominantly phosphorus. Since 1988, annual total phosphorus loading from the McCall WWTP effluent has remained relatively stable, ranging from 3815 kg to 4751 kg annually. Following changes in feeding management practices at the IDFG fish hatchery, total phosphorus loads have fallen from 726 kg/year (average) to 218 kg (average) total phosphorus annually.

Nonpoint Source Pollution

Major nonpoint sources of phosphorus within the watershed include forestry, agricultural and urban/suburban management practices, and internal recycling of nutrients within the reservoir. Due to the complexity inherent in the evaluation of nonpoint sources, each of these major categories was evaluated separately.

Forestry Management Sources

A total of 184,092 acres are included in the forestry land-use designation of the watershed, representing 66.6% of the total land area. Forestry management practices include timber harvest and related activities such as road construction and use and livestock grazing on forested allotments. The major pollutant associated with forestry management practices is sediment that may contain phosphates and carry adsorbed nutrients. Traditional timber harvest activities can result in increased

sediment loads within the watershed due to construction of roads, erosion of road surfaces, landslides on destabilized slopes and erosion of harvest areas. Recreational use of existing forest roads also contributes to the overall sediment load. The geology of forested lands within the Cascade Reservoir Watershed is conducive to erosion and sediment production. Predominant lithology is granite and related basaltic rocks that are decomposing to unstable, easily transportable sediments. Nearly all forested areas within the watershed have an extensive network of roads that increases sediment yields. Local lithology also contributes to landslides. Most slides are due to natural causes but some are management induced.

Impacts from grazing practices include increased sediment and nutrient loading due to erosion of stream bank areas destabilized by animal impacts and waste deposition. As grazing animals frequent streambank areas due to easy access to water, wastes are often deposited directly in the stream channel. Grazing often results in decreased stubble height and damage to riparian areas due to removal of vegetation and hoof action on stream bank sediments.

Agricultural Management Sources

A total of 66,344 acres were identified under agricultural land-use within the watershed, representing 24% of the total land area. Irrigated pasture land (used for grazing cattle) accounts for the majority of the agricultural land-use acres. Pollutants associated with agricultural practices are sediment and nutrients present in both dissolved and sediment-bound forms. Related impacts are alteration of stream flows and temperatures.

Impacts from grazing practices include direct and indirect effects related to sediment and pollutant loading. Local streams represent the major source of water for livestock and a secondary source of forage. Access to streams is generally unrestricted. The shearing action of hooves on stream banks destabilizes the soil and increases the potential for significant erosion. Grazing cattle also remove or substantially reduce riparian vegetation, thus decreasing stability of stream banks and reducing depositional areas for sediment already within the water column (Platts and Nelson, 1995). Grazing practices also contribute to nutrient loading through the deposition and transport of animal wastes. Manure concentration per unit of land is relatively small but the total grazed-land area is very large and correlates well with major water bodies, resulting in a greater potential for direct transport.

Related impacts include increased water temperatures in the tributaries due to removal of streamside vegetation, allowing greater dissolution of adsorbed phosphorus, sheet and rill erosion from storm events and subsurface compaction of soils. Vegetation in over-utilized pasture areas is commonly insufficient to retain sediment within overland flow and deposited manure is easily transported directly into or down stream within existing stream and irrigation channels (NRCE, 1996).

Practices like sub-flood irrigation that create a substantially increased subsurface flow can also lead to increased phosphorus loading as irrigation recharge and surface runoff created by sub-flood irrigation practices are diverted to local streams or returns as shallow ground water. These waters generally contain high concentrations of phosphorus and nitrogen compared to ambient concentrations of local streams (Klahr, 1988). These same irrigation systems funnel and accelerate delivery of runoff from snowmelt during spring thaw. In addition, inefficient irrigation water

management practices can reduce stream flows unnecessarily, resulting in increased water temperatures.

Impacts from cropping within the watershed are relatively minor due to the small acreages dedicated to crop production. These impacts include those detailed for sub-flood irrigation in the section above and the impacts of fertilizers applied in the production of grains and to establish growth in newly seeded pastures. Fertilizer is reportedly not frequently applied to pastures once growth is established.

Urban/Suburban Sources

Urban/suburban land-use totals 25,945 acres within the watershed, representing 9.4% of the total land area. The major urban/suburban centers in the Cascade Reservoir watershed are the incorporated cities and city impact areas of Cascade (population ~1120), Donnelly (population ~200) and McCall (population ~2600). A significant increase in population occurs during summer months when part-time residents and tourists frequent the area. Most of the City of Cascade is located outside the hydrologic drainage of the Cascade Reservoir. Runoff from Donnelly discharges into Boulder Creek and Willow Creek. Approximately half of the City of McCall is within the drainage of the North Fork of the Payette River. Pollutant sources of concern associated with urban runoff include nutrients, sediment from erosion of conveyance systems, oils, pesticides and bacteria.

Subdivisions aggregated around the north end, on the west side and in the southwest reach of the reservoir have been identified as potential nutrient source locations due to inadequate retention time and treatment of septic tank effluent. Both locations are dominated by high ground-water tables, evidence of ground-water contamination, high septic tank density and poor soil types.

Potential impacts from recreational activities are varied, ranging from increased erosion potential caused by irresponsible off-road vehicle use to direct contamination of surface water by personal water craft or accidental fuel spills. Pollutants of concern generated by recreational use of the watershed include (but are not limited to) hydrocarbons from outboard motors, organic material from fish cleaning, potential bacterial contamination from human waste (improper sanitary disposal) and addition of nutrients, grease and oils from parking lot runoff at campgrounds and boat ramps. Sediments are also contributed by erosion of banks around popular beach areas and camping sites.

Internal Recycling and Reservoir Water Levels

Phosphorus contained in reservoir bed sediments represents a significant loading source to the water column. Increased phosphorus release from bed sediments has been observed under anaerobic conditions. Low dissolved oxygen levels lead to sediment release of bound phosphorus in this manner. Availability of sediment-bound phosphorus and potential leaching into surface water can also be affected by operational conditions controlling the water depth over the reservoir sediments. Fluctuating water levels that periodically expose lake sediments or alter the aerobic/anaerobic conditions at the sediment/water interface affect the sink/source characteristics of these sediments. Under annual drawdown conditions, sediment phosphorus availability may be increased, further contributing to the enrichment of the water column and increased algal productivity.

Data gaps have been identified within NFPR and Cascade subwatersheds. While accurate calculation of total measured annual phosphorus loading for NFPR is possible from monitoring data, the total amount of phosphorus attributable to bank erosion is currently under study. No consistent monitoring data is available for the Cascade subwatershed. Load and reduction allocations have been estimated using available information on land-use practices and comparing specific land-use acreages and flow volumes to other, similar subwatersheds for which comprehensive monitoring is available.

Water-Quality Targets

Load capacity has been assessed on the achievement of inflake water-quality targets based on numerical standards for phosphorus (0.025 mg/L inflake total phosphorus concentration), chlorophyll *a* (10 µg/L inflake chlorophyll *a* concentration) and dissolved oxygen (concentrations exceeding 6 mg/L at all times, with the exceptions listed previously). These targets, based on water-quality modeling efforts for Cascade Reservoir, were set to achieve full support of designated beneficial uses (specifically fishing, swimming, boating and agricultural water supply). Pollutant loads are allocated as kg/year total phosphorus. Load capacity was divided among load allocations, waste-load allocations and a margin of safety.

Load Capacity

To evaluate load capacity for the reservoir, monitoring data was used to calibrate and validate two computer models specific to Cascade Reservoir. The revised Cascade Reservoir 1-D Model (Worth, 1997; Chapra, 1990) and the BETTER Model (Bender, 1997) were used to simulate changes in reservoir total phosphorus and chlorophyll *a* concentrations in response to changes in total phosphorus contributed by the subwatersheds. The results of the computer modeling were used to determine the level of phosphorus loading resulting in acceptable water-quality concentrations. The maximum acceptable total phosphorus loading value generated was about 70% of the averaged total phosphorus loading measured by instream tributary monitoring, thus requiring a 30% overall load reduction. To further assure attainment of water-quality standards inflake and to account for the precision of monitored values, and confidence intervals on estimated values and assumptions made, a 7% margin of safety (MOS) was established, making the total required reduction 37%.

Estimates of Existing Pollutant Loads

An annual phosphorus load allocation was established for Cascade Reservoir using measured total

phosphorus loads for water years 1993 through 1996. External contributions of total phosphorus (measured in kg/yr) from point and nonpoint sources were evaluated to determine current loading and establish a quantitative value from which appropriate reduction levels could be assessed. The water years evaluated represent both above average and below average precipitation levels. Existing monitoring data was combined with modeling results to allow reasonably accurate estimates of the subwatershed loads generated by each of the major land-use categories (forestry, agriculture and urban/suburban). The loads estimated by this modeling process were then summed to provide a total estimated load contribution specific to each subwatershed. The relative percentage of the total estimated management load was determined for each land use within the watershed. This percentage (combined with the appropriate percentage of the natural load identified for that subwatershed) was applied to the total measured load for each subwatershed. In this manner, it was possible to account for differences in load contribution specific to land use within a subwatershed.

Estimated nonpoint source runoff accounts for the majority of phosphorus input to the reservoir, averaging 83% in an assessment of current and historical monitoring data. Estimated point source loading averages 9.5%. Phosphorus contribution from septic tank effluent was estimated at 5.5% of the total load. Contributions of phosphorus from direct rainfall were based on precipitation data, applying a phosphorus content of rainfall (assumed equal to 0.05 mg/L) and multiplying by the volume of direct rainfall/snowfall in the water budget. Actual measurements of phosphorus content in rainfall have not been obtained and could be underestimated in the loading budget. Internal recycling was estimated as representing roughly 8,700 kg total phosphorus annually. However, it should be noted that seasonal and annual variance associated with nonpoint sources and internal recycling are likely to be significant, and actual contributions are expected to vary considerably under differing limnological conditions.

Calculations of natural contribution were made specific to slope and vegetative cover throughout the subwatersheds. The natural contribution from shallow-sloped acreages (<12%) was assessed as the sum of sheet and rill erosion and snowmelt-based erosion. The natural contribution of total phosphorus from steeply-sloped acreages ($\geq 12\%$) was calculated using a combination of long-term monitoring data available in subwatersheds with little or no recent management activities and computer modeling by both Boise Cascade Corporation and the US Forest Service for estimation of erosion based sediment loads. Both soil creep and mass-wasting events (e.g. landslides) were accounted for. Additionally, a sediment transmittance factor for Little Payette Lake and the background contribution from Big Payette Lake were assessed.

Load Allocations

As part of this plan to improve the quality of water in Cascade Reservoir, the 37% total phosphorus reduction identified is anticipated to result in water-quality improvements that attain the desired water-quality objectives of 0.025 mg/L total phosphorus and 10 $\mu\text{g/L}$ chlorophyll *a* in the reservoir. Reductions required are based on assessment of the maximum inflake load that can be sustained without beneficial use impairment. Reductions were assessed at the level required to achieve the inflake water-quality objectives for phosphorus concentration.

To accomplish this overall reduction, point-source reductions totaling 7% of the total phosphorus

load, and nonpoint-source reductions totaling 30% of the total phosphorus load (management load plus natural and/or background load) have been calculated on both a subwatershed and a subwatershed land-use basis. In the NFPR, the subwatershed load allocation reflects full (100%) removal of the City of McCall's WWTP, the changes in feeding management practices already in place for the IDFG fish hatchery, and a 30% reduction of all nonpoint sources. In all nonpoint-source reduction allocations, a 30% reduction of the total load (management load plus natural and/or background load) is possible from management sources alone. Attainment of the 30% overall nonpoint-source reduction may be difficult in some subwatersheds (i.e. Gold Fork) where natural phosphorus loads represent the majority of the total load. It should be understood that an overall reduction of 30% of the nonpoint-source total phosphorus load (management load plus natural and/or background load) is required to reach water-quality standards. It is recognized that efficient use of management efforts and available implementation monies should be of primary concern. Therefore, it is reasonable to expect that the 30% nonpoint source reduction goal may be reached by implementation measures resulting in greater than 30% in some subwatersheds to offset less than 30% reductions in others.

Compliance Strategy

Success in reducing the current annual load of total phosphorus will be measured by comparing individual subwatershed allocations with the measured contributions monitored at or near the mouth of major tributaries.

DEQ will rely upon existing authorities and voluntary implementation of additional phosphorus reduction measures to achieve the goals and objectives of this plan. Attainment of water-quality objectives and full support of beneficial uses for Cascade Reservoir, as demonstrated by this plan, will require a significant long-term coordinated effort from all pollutant sources throughout the watershed.

For point source discharges of pollutants subject to NPDES permits, DEQ will ensure achievement of water-quality goals established in this plan through water-quality certifications provided in Section 401 of the CWA.

For nonpoint sources, the feedback loop will be used to achieve water-quality goals. DEQ and other involved agencies will conduct instream and/or qualitative effectiveness monitoring throughout the watershed to evaluate the overall effectiveness of best management practices (BMPs) and other restoration projects in reducing phosphorous loading. If BMPs and other restoration projects prove ineffective they will be modified to ensure effectiveness of existing and future projects. Any modifications to required BMPs will be subject to state rule-making requirements. DEQ will work closely with the CRCC, applicable resource agencies and affected parties to review the existing regulatory authorities and determine if there is a need for additional requirements for nonpoint sources activities to achieve the goals of the plan.

DEQ's regulatory and enforcement authorities are generally set forth in the Idaho Environmental Health and Protection Act of 1972, as amended (See Idaho Code Sections 39-101 *et. seq.*).

Within 18 months of the approval of the Phase II Watershed Management Plan, an implementation

plan will be prepared identifying specific areas and measures to be taken to reach the 37% reductions outlined above. Following the approval of the implementation plan, a Phase III document will be prepared (December 2003) using monitoring data to evaluate progress toward attainment of water-quality standards and support of designated beneficial uses. If goals are being reached, or if trend analysis indicates that improvements made are substantial enough to result in attainment of water-quality objectives within a reasonable time frame, the watershed management plan will be a success. If not, the plan will be revised and will outline new goals and a new implementation strategy.